REMARKS

The specification and drawings have been amended to correct several informalities. Claims 1-7, 12, and 14-34 have been amended to correct several informalities and clarify the claimed invention. Claims 8-11 and 13 have been canceled. Claims 1-7, 12 and 14-34 are currently pending in the application. For the reasons set forth below, Applicants believe that the objections and rejections should be withdrawn and that the claims are in condition for allowance.

OBJECTION TO THE SPECIFICATION

The Examiner objected to the specification under 35 U.S.C. 112, first paragraph, for failing to be written in full, clear, concise and exact terms. For example, the Examiner noted that variables ϕ_o, λ, and L contain no description of the measurement units used for the calculations and multiple variables require subscript notation for clarification.

The specification and drawings have been amended to provide proper subscript notation and describe the measurement units used for calculations. Specifically, the specification has been amended to change "ϕo" to "ϕ_o" and other subscript notations have been properly amended. As generally known in the art of electric field sensors the measurement units are meters and "λ is a wavelength" has been amended to "λ is a wavelength (meter)" and "L is a length" has been amended to "L is a length (meter)" to describe the measurement units used for the calculations. Accordingly, the objection to the specification under 35 U.S.C. 112, first paragraph, should be withdrawn.

OBJECTION TO CLAIMS 11, 14-17, 21-25, 28, 29 and 31-34

The Examiner objected to Claims 11, 14-17, 21-25, 28, 29 and 31-34 for the following informalities:

Claim 11 – light source (8) is nonexistent;

Claims 17, 24, 28, 29, 31 and 32 – contain improper variable "ϕo"; and

Claims 14-17, 21-25, 28, 29 and 31-34 – contain improper variables "no" and "ne".

The foregoing amendment cancels Claim 11. Accordingly, the objection to Claim 11 is now moot.

Claims 17, 24, 28, 29, 31 and 32 have been amended to provide proper subscript notation by amending "ϕo" to "ϕ_o". Claims 14-17, 21-25, 28, 29 and 31-34 have been amended to provide proper subscript notation by amending "no" to "n_o" and "ne" to "n_e". Accordingly, the objection to Claims 14-17, 21-25, 28, 29 and 31-34 should be withdrawn.

REJECTION OF CLAIMS 14-17, 21-25, 28, 29 AND 31-34 UNDER 35 U.S.C. 112

The Examiner rejected Claims 14-17, 21-25, 28, 29 and 31-34 under 35 U.S.C. 112, first paragraph, for failing to comply with the enablement requirement. The Examiner alleged that the variables ϕ_o, λ, and L contain no limitation on the measurement units. The Examiner also alleged that the equation $n \cdot 45° - \phi_o/2$ is not mathematically enabling.

Claims 14-17, 21-25, 28, 29 and 31-34 have been amended to describe the measurement units. As mentioned above, "λ is a wavelength" has been amended to "λ is a wavelength (meter)" and "L is a length" has been amended to "L is a length (meter)" throughout the claims and specification. In addition the equation "$n \cdot 45° - \phi_o/2$" has been properly changed to "$n \cdot \pi/4 - \phi_o/2$" and "45°" has been amended to "$\pi/4$" throughout the claims and specification to be mathematically enabling. Accordingly, the rejection of Claims 14-17, 21-25, 28, 29 and 31-34 under 35 U.S.C. 112, first paragraph, should be withdrawn.

REJECTION OF CLAIMS 18, 19, 20, 26, 27 AND 30 UNDER 35 U.S.C. 112

The Examiner rejected Claims 18, 19, 20, 26, 27 and 30 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner alleged that the limitation of Claims 18, 19, 26 and 27, "when the electric field based on the signal under test is not applied, based on the alternate current signal obtained by said detector" is unclear.

To clarify the "the alternate current signal" limitation, Claims 18, 19, 26 and 27 have been amended to recite "control signal generating means, for generating the control signal that offsets, based on the alternate current signal obtained by said detector, a change in the polarization state of the light incident from said light source when the electric field based on the signal under test is not applied." According to one embodiment, the "alternate current signal" corresponds to the output signal 21 as illustrated in Figure 12, or a signal defined by the output signals 17, 19 illustrated in Figure 18.

Claims 18, 19, 26 and 27 have been amended to correct inconsistencies and more distinctly claim the subject matter which the Applicants regard as the invention. Accordingly, the rejection of Claims 18, 19, 26 and 27 under 35 U.S.C. 112, second paragraph, should be withdrawn.

Claims 20 and 30 depend from Claims 18 and 19. Accordingly, for at least the same reasons discussed above, the rejection of Claims 20 and 30 under 35 U.S.C. 112, second paragraph, should be withdrawn.

REJECTION OF CLAIMS 1 and 4 UNDER 35 U.S.C. 102(b)

The Examiner rejected Claims 1 and 4 under 35 U.S.C. 102(b) as being anticipated by Japanese Publication No. 2003-098206 to Mitsuru *et al.* ("Mitsuru"). To anticipate a claim under 35 U.S.C. 102(b) a reference must disclose each and every claimed limitation. As discussed below, this rejection is respectfully traversed.

Claim 1

Claim 1 requires "an auxiliary electrode that is electrically connected to said second electrode, and that forms a capacitance with the ground." According to one embodiment, as illustrated in Figure 33, the auxiliary electrode 61 is connected to the second electrode 12 and forms a capacitance with the ground. One advantage of the claimed configuration is that the electric lines of force generated between the first electrode and the second electrode can be effectively applied to the electro optic crystal (such that the amplitude of the electric field can be increased) so the high sensitivity of the electric field sensor can be achieved.

The Examiner alleged that the ground electrode 31 in Figure 1 of Mitsuru discloses the auxiliary electrode required by Claim 1. Figure 1 of Mitsuru illustrates that the ground electrode 31 is connected to the ground. *See also*, [0031]. The ground electrode 31 does not form a capacitance with the ground. Mitsuru does not describe or suggest an auxiliary electrode that is connected to said second electrode, and that forms a capacitance with the ground, as required by Claim 1. Claim 1 is patentable over Mitsuru.

Claim 4

Claim 4 depends from Claim 1. Accordingly, for at least the same reasons discussed above, Claim 4 is patentable over Mitsuru.

REJECTION OF CLAIMS 8-11 UNDER 35 U.S.C. 102(b)

The Examiner rejected Claims 8-11 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,624,644 to Ito *et al.* ("Ito").

Claims 8-11 have been canceled. Accordingly, the rejection of Claim 8-11 under 35 U.S.C. 102(b) is now moot.

REJECTION OF CLAIMS 2 AND 3 UNDER 35 U.S.C. 103(a)

The Examiner rejected Claims 2 and 3 under 35 U.S.C. 103(a) as being unpatentable over Mitsuru in view of U.S. Patent No. 5,789,846 to Brown ("Brown"). As discussed below, this rejection is respectfully traversed.

Claims 2 and 3 depend directly or indirectly from Claim 1. Accordingly, for at least the same reasons discussed above with respect to Mitsuru, Claims 2 and 3 are patentable over Mitsuru in view of Brown.

Furthermore, Brown neither discloses nor suggests an auxiliary electrode as required by Claims 2 and 3. The Examiner alleged that the primary ground electrode G illustrated in Figure 1 of Brown discloses the auxiliary electrode. The primary ground electrode G is not an auxiliary electrode that forms a capacitance with the ground, as required by Claims 2 and

3 by virtue of dependence from Claim 1. Accordingly, Claims 2 and 3 are patenatable over Mitsuru and Brown.

REJECTION OF CLAIMS 5 AND 7 UNDER 35 U.S.C. 103(a)

The Examiner rejected Claims 5 and 7 under 35 U.S.C. 103(a) as being unpatentable over Mitsuru. As discussed below, this rejection is respectfully traversed.

Claims 5 and 7 depend directly or indirectly from Claim 1. Accordingly, for at least the same reasons discussed above, Claims 5 and 7 are patentable over Mitsuru.

REJECTION OF CLAIM 12 UNDER 35 U.S.C. 103(a)

The Examiner rejected Claim 12 under 35 U.S.C. 103(a) as being unpatentable over Ito in view of U.S. Publication No. 2004/0227942 to Law *et al.* ("Law"). As discussed below, this rejection is respectfully traversed.

Claim 12 has been amended to clarify that "wherein a part of the circularly polarized light reflected from a light receiving surface of said first photo detector passes through said first quarter wave plate to be converted into the S polarized light, which is then reflected from said polarizing beam splitter, and a part of the circularly polarized light reflected from a light receiving surface of said second photo detector passes through said second quarter wave plate to be converted into the p polarized light, which passes through said polarizing beam splitter so that the circularly polarized light reflected from the light receiving surfaces of said first and second photo detectors is prevented from returning toward said electro optic crystal." This limitation is described throughout the specification, see for example paragraphs [0235] thru [0237].

The claimed limitation produces an effect wherein the deviation of the light emitted from a light source caused by the light which returns toward the electro optic crystal is controlled such that the noises due to the reflected light is prevented (*i.e.*, a returning-light prevention feature).

The Examiner acknowledged that Ito fails to disclose two quarter wave plates that convert the separate S and P polarized light components into circularly polarized light after being split by the polarized beam splitter. The Examiner relied on Law for disclosing the two quarter wave plates functionality. As illustrated in Figure 6D of Law, as cited by the Examiner, Law discloses that the light transmitted through the fiber (elliptically polarized light in general) is divided by means of the beam splitter 24, so the light incident into retarders 600E, 602E is elliptically polarized light.

Law does not disclose or suggest a returning-light prevention feature as defined in the above described amendment to Claim 12. Accordingly, Claim 12 is patentable over Ito in view of Law.

REJECTION OF CLAIM 13 UNDER 35 U.S.C. 103(a)

The Examiner rejected Claim 13 under 35 U.S.C. 103(a) as being unpatentable over Japanese Publication No. 10-132865 to Hiroshi ("Hiroshi") in view of Ito. As discussed below, this rejection is respectfully traversed.

Claim 13 has been canceled. The rejection of Claim 13 under 35 U.S.C. 103(a) is now moot. However, the subject matter of canceled Claim 13 has been incorporated into amended Claims 14-16 and 18-19. Thus Hiroshi as cited by the Examiner will be discussed with respect to amended Claims 14-16.

Claims 14-16 and 18-19

As illustrated in Figure 1, Hiroshi discloses converting a light into a circularly polarized light by rotating the analyzer 5 and the polarizer 2 in order to maximize the sensitivity.

Hiroshi does not disclose or suggest the various compensating means as required by Claims 14-16 and 18-19. For example, Claim 14 requires a compensating means that comprises "a quarter wave plate of which an electric main axis coincides with a main axis of an elliptically polarized light emitted from said electro optic crystal, and which converts the elliptically polarized light into a linearly polarized light, and a half wave plate that adjusts an angle of a polarization surface of the linearly polarized light emitted from said quarter wave

plate based on a fact that an angle formed between an electric main axis of said half wave plate and the electric main axis of said electro optic crystal is $n \cdot \pi/4 - \phi_o/2$ (where n is an integer) when an angle formed between the polarization surface of the linearly polarized light from said quarter wave plate and the electric main axis of said electro optic crystal is $\pi/4 - \phi_o$ without the electric field applied."

Also note that the Examiner did not rely on Ito for disclosing or suggesting a compensating means. Accordingly, amended Claims 14-16 and 18-19 are patentable over Hiroshi in view of Ito.

ALLOWABLE SUBJECT MATTER

The Examiner indicated that Claim 6 would be allowable is rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 6 depends (indirectly) from independent Claim 1. As discussed above, Claim 1 is patentable over Mitsuru. Accordingly, Claim 6 has not been rewritten in independent form.

CONCLUSION

This application should now be in condition for allowance, and the Applicant solicits a notice to that effect. If there are any issues that can be addressed via telephone, the Examiner is asked to contact the undersigned at 404.685.6799. The Commissioner is authorized to charge any additional fees that may be due or credit any over payment to Deposit Account No. 11-0855.

Respectfully submitted,

/Brenda O. Holmes/

Brenda O. Holmes
Reg. No. 40,339

Kilpatrick Stockton LLP
1100 Peachtree Street, Suite 2800
Atlanta, Georgia 30309
(404) 815-6500
KS File: 44471/313606